

1746

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T5J 3T2

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Tel 780.917.5231  
Fax 780.421.7951

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DATE July 27, 2004

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FROM Edward (Ted) Yoo

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Message  
Application No.: 09/682,427  
Filing Date: August 31, 2001  
Inventor (first named): Prediger  
Group Art Unit: 1746  
Examiner Name: CREPEAU, Jonathan  
Attorney Docket No.: 45283.7

Enclosed is Response to Final Office Action dated June 7, 2004.

Edward Yoo 41435

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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Application No.: 09/682,427  
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Inventor (first named): Prediger  
Group Art Unit: 1746  
Examiner Name: CREPEAU, Jonathan  
Attorney Docket No.: 45283.7

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FAX No. 703-872-9306 to the U.S. Patent and Trademark Office, Attention: Examiner Jonathan Crepeau,  
at Group Art Unit 1746 in Arlington, VA 22202

  
EILEEN LUCAS

DATED: July 27, 2004

AMENDMENT & RESPONSE TO FINAL OFFICE ACTION MAILED 06/07/2004

To: Assistant Commissioner for Patents  
Washington, DC 20231

Sir:

This is in response to the Office Action mailed June 7, 2004 and is within the three month period for reply.

Reconsideration of the application is respectfully requested.

1. The Examiner has rejected claims 1-4, 6-9, 11 and 13-16 as being obvious in light of JP 7-6778 in view of Wilkinson et al., US Patent No. 6,096,448 (the "Wilkinson reference"). With respect, it is submitted that the teachings of these two references when combined do not teach all the limitations of the claimed invention, and one skilled in the art would not be motivated to combine the teachings of these two references in any event.

It is stated in MPEP, para. 2143:

In order to establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Further, in para. 2141.02, it is stated:

"In determining the differences between the prior art and the claims, the question under 35 USC 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious."

And finally, also in para. 2141.02, it is stated:

"A prior art reference must be considered in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention."

It is respectfully submitted that the application of these principles does not result in a *prima facie* case of obviousness.

First, the claimed invention as a whole is directed to a method for maintaining a reducing atmosphere around the anode of a solid oxide fuel cell. The method comprises the step of applying an external voltage to the cell, causing reverse oxygen ion flow, thus maintaining an acceptable partial pressure of oxygen at the anode. The method also comprises the step of monitoring the cell voltage in order to determine when to apply the external voltage. The trigger voltage level is that which corresponds to the nickel-nickel oxide equilibrium voltage.

The Examiner has identified a prior art document, JP '788 which is said to teach the first step – the application of an external voltage in order to transport oxygen ions across the electrolyte to the cathode.

The Examiner has identified a second prior art document, the Wilkinson reference, which is said to teach the second step – monitoring cell voltage and triggering an anode rejuvenating or protective action when the cell voltage reaches the trigger voltage level.

It is respectfully submitted that the Wilkinson reference does not teach the second step. In Wilkinson, cell voltage or any other cell operating parameter, is monitored to determine when to cease anode rejuvenation, not when to commence anode rejuvenation. As stated in Wilkinson (column 7, lines 45-51):

"The duration of the periodic fuel supply interruptions [anode rejuvenating action] may be, for example, increased until the fuel cell almost ceases to produce useful electrical power or reaches a condition where cell reversal is about to occur. Fuel cell operating parameters which are indicators of such limits may be monitored to determine when these limits are approached. The duration of fuel starvation may be adjusted in response to one or more monitored fuel cell operating parameters to enhance poison removal." [emphasis added]

In other words, in Wilkinson, cell voltage is monitored in order to optimize anode rejuvenation as it is occurring. The fuel cell is starved of fuel for so long as the cell does not reverse voltage, which could damage the cell. Cell voltage is not monitored to determine if the anode requires rejuvenation, but rather it is monitored to determine how long the rejuvenating action should occur.

With respect to the frequency of the fuel starvation events, i.e. when the event should occur, Wilkinson does not teach anything different than the JP '788 reference. As stated in Wilkinson (column 7, lines 58-61):

"With respect to frequency, the interruptions may be spaced at fixed time intervals or variable time intervals which are adjusted according to factors such as, for example, the concentration of poisons ... and the configuration of the flow field."

Please note that cell voltage is not a factor which determines frequency or when the fuel interruption takes place.

The Wilkinson reference does teach that an operating parameter of a fuel cell may be monitored however, as a whole, it teaches away from the claimed invention. In Wilkinson, cell voltage is monitored to determine when an anode rejuvenating action should stop – in other words cell voltage determines the duration of the event. In the claimed invention, cell voltage is monitored to determine when an anode protective step should commence. The two situations are very different.

The first two steps in the *Graham* factual inquiry are to determine the scope and contents of the prior art and then to ascertain the differences. The differences in this case are significant. The combination of JP '788 and the Wilkinson patent do not teach all the limitations of the claimed invention, as is required. This is particularly so when one considers the invention as a whole. In both prior art references, an anode rejuvenation step is taken periodically, without any monitoring of a cell parameter to initiate it. In the present invention, an anode protective step is initiated by monitoring a crucial cell parameter. In the present invention, the need for anode rejuvenation is greatly reduced because the anode is substantially protected from oxidation.

### CONCLUSION

In view of the foregoing remarks and amendments, it is respectfully submitted that this application is in condition for allowance and allowance thereof is respectfully requested.

Respectfully submitted,

Dennis Prediger and Debabrata Ghosh

By: 

Edward Yoo (Reg. No. 41,435)

CORRESPONDENCE ADDRESS:  
CUSTOMER #22828

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